

# Gender-Related Perceptions and Stress, Anxiety, and Depression on the Flight Deck

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**Abstract.** This study explored gender-related perceptions among male and female pilots and the extent to which such perceptions may cause workplace stress, anxiety, or depression which may affect female pilots. This study utilized two measuring instruments on a sample that consisted of 83 pilots. The two measurement instruments used were the Aviation Gender Attitude Questionnaire (AGAQ) to measure gender bias and the Depression Anxiety Stress Scales-21 (DASS-21) to measure stress, depression, and anxiety among female pilots. There was a significant difference found between men and women across all AGAQ factors. While the results of this study concurred with research that suggests that female pilots are at greater risk for negative perceptions and sexism by male pilots, the results did not indicate any greater degrees of depression, stress, or anxiety in women as compared with their male counterparts.

**Keywords:** pilots, gender, stress, depression, anxiety

Gender perceptions are attitudes held by a society that influence how men and women growing up in that society are inculcated into the gender system (Liedberg, Björk, & Hensing, 2010). These attitudes are a function of the history, culture, daily interactions, and social norms of the society and heavily influence gender stereotypes and roles, beliefs about strengths and weaknesses of the genders, occupational choices open to the genders, choice of college majors, etc. (Bradley, 2000; Eagly, 1987; Li, 1999; Liedberg et al., 2010). Within these gender perceptions, there are few occupations considered to be gender-neutral (Diamond & Whiteside, 2007; Lippa, 2005). The masculinization or feminization of an occupation often defines who enters the occupation, thus producing at some level a collusion by the genders on the continuation of gender-specific perceptions of particular occupations (Atkinson, 2009).

Entry by women into male gender-specific occupations often results in sexism, high scrutiny, isolation and ostracism, less favorable advancement opportunities, harassment to include sexual harassment, gender-role stereotypes, work-home conflicts, higher occupational dropout rates, and the need to adapt by assuming gender-incongruent behaviors (Cohen & Huffman, 2003; DiDonato & Strough, 2013; Germain, Herzog, & Hamilton, 2012; Huppertz & Goodwin, 2013; Watson, Goh, & Sawang, 2011). Consistent with role strain theory (Kantor, 1977), these are all attitudes which, if held in the workplace, are negative in nature and can produce stress, strain, and anxiety for the targeted

individuals (Cohen & Huffman, 2003; DiDonato & Strough, 2013; Huppertz & Goodwin, 2013). This is especially true for women, who are often devalued anyway (Germain et al., 2012). The sequelae to workplace stress may include psychological and physiological reactions such as, but not necessarily limited to, emotional distress such as anxiety and depression, frequent headaches, muscle tension, change in sleep pattern or change in appetite, digestive problems, hormonal changes, muscular system changes, increase in heart rate, and changes in the immune and metabolic systems (Rice, 2012). These manifestations may be more evident in women when the work environment is seen as hostile or as a threat (Watson et al., 2011), particularly where interpersonal conflict, the primary source of occupational stress, may be high (Mazzola, Schonfeld, & Spector, 2011).

Research has consistently shown that women in such gender-incongruent roles are significantly more stressed than their male counterparts; experience greater degrees of health problems; report lower levels of self-efficacy, self-esteem, and self-worth; experience a devaluing of their contributions; hold lowered expectations of success; and perceive lower support and commitment from the organization in comparison with their male counterparts (Germain et al., 2012; Heilman & Okimoto, 2007; Heilman, Wallen, Fuchs, & Tamkins, 2004; Jacobs, Tytherleigh, Webb, & Cooper, 2010). By contrast, men working in female-specific occupations may not experience the same negative

effects and associated stress, because they are seen as being in that setting by choice, rather than forced by gender, and because men may advance faster in gender-incongruent occupations than women, because men may be perceived as being better leaders (Jacobs et al., 2010).

Aviation, in particular, is one of those non-gender-neutral occupations. It has been historically considered to be a fixed (specific to one gender only; Blackburn & Jarman, 2006) masculine occupation (Germain et al., 2012; Kristovics, Mitchell, Vermeulen, Wilson, & Martinussen, 2006). Such gender-specific occupations produce their own unique cultures and dispositions to include gendered cultures and gendered dispositions (DiDonato & Strough, 2013; Huppertz & Goodwin, 2013). Indeed, women experience a *rite of passage* not experienced by men as they transition into the gendered culture of the airline pilot industry (Davey & Davidson, 2000). The continuation of the gendered culture of masculine beliefs, values, and gender biases (Mitchell, Kristovics, Vermeulen, Wilson, & Martinussen, 2005) of the air pilot industry has resulted in sexism, high visibility and scrutiny, isolation and ostracism, less favorable advancement opportunities, and harassment of female pilots (Davey & Davidson, 2000; Kristovics et al., 2006; Mitchell et al., 2005), leading many female pilots to quit the airline industry (Germain et al., 2012). Additionally, some research (e.g., Dukes, Hulbert-Johnson, Newton, & Overstreet, 1991) has indicated that the stereotypic negative gender perceptions toward female pilots even extend to passengers on commercial flights. Again, such negative attitudes can lead to stress, anxiety, health issues, etc. (Davey & Davidson, 2000; Germain et al., 2012; Kristovics et al., 2006; Mitchell et al., 2005).

Some might argue that affirmative action policies, instituted to level the playing field in many settings, to include employment, would offset the negatives which tend to accrue to women in a gender-incongruent occupation such as that of a pilot. However, Muchinsky (2003) and Germain et al. (2012) have suggested that female pilots have been damaged by affirmative action policies, in that it may appear that female pilots have been hired due to affirmative action rather than skill or ability. Additionally, female pilots-in-training may feel they are in training simply because of their gender, thus getting a break through affirmative action, rather than being trained based on perceived ability (Kristovics et al., 2006). So even affirmative action may work against female pilots, thus adding to the negatives of the work environment. The research by Davey and Davidson (2000) suggested that female pilots, to make it within the masculine-gendered culture of the industry, often adapt gender-incongruent behaviors, including laughing at sexist jokes, drinking with the male pilots, and otherwise becoming *one of the boys*. Adapting gender-incongruent behaviors, however, has a price in terms of increased stress, in that these behaviors are seen as less attractive in women (Gerdes, 1995; Germain et al., 2012). In an almost counterintuitive way, attitudes by pilot instructors toward female students seem to be enhanced when the woman portrays the typical role expected of women regarding dress, behavior, deference, etc. (Davey, 2004) and

diminished if the female pilot-in-training shows a high level of competence (Germain et al., 2012).

With regard to these stereotypic beliefs, research has not generally supported any real differences in abilities between male and female pilots. For example, an examination of intelligence as measured by the adult Wechsler scale among US Air Force pilots did not find any significant differences by gender (Kratz, Poppen, & Burroughs, 2007). Studies looking at aircraft accidents have not found differences in accident rates by gender (Bazargan & Guzhva, 2011; Caldwell & LeDuc, 1998; Mitchell et al., 2005; Puckett & Hynes, 2011; Vail & Ekman, 1986), though there may be gender differences in the type of accident (Baker, Grabowski, & Guohua, 2001). Jonas (2001), reporting on a study conducted by the Johns Hopkins Bloomberg School of Public Health and reported in the May 2001 issue of *Aviation, Space, and Environmental Medicine*, stated that the authors had examined accident rates of male and female private pilots and found that men were more likely to have accidents related to inattention or poor planning (e.g., ignoring weather conditions, taking unnecessary risks), while female pilots were more likely to have accidents due to mishandling the aircraft (e.g., panic maneuvers, ignoring the kinetics of the aircraft). The rates of pilot error as the cause of an accident were reported to be 95% for men and 88% for women (Baker et al., 2001; Jonas, 2001).

The purpose of this research was to determine if, and to what extent, gender-related perceptions exist within the European and American pilot community. If negative gender-related perceptions were found, then to what extent did these perceptions affect the stress, anxiety, and depression levels of female pilots? The study utilized two measurement instruments: the Aviation Gender Attitude Questionnaire (AGAQ; Vermeulen & Mitchell, 2007) to measure gender bias and the Depression Anxiety Stress Scales-21 (DASS-21; Lovibond & Lovibond, 1995) to measure stress among female pilots.

## Method

### Participants

Information about participants was collected from a survey located on SurveyMonkey.com (<https://www.surveymonkey.com>), a popular Internet survey site used to collect data for a number of different studies and purposes. The sample consisted of 83 pilots, with 31 women and 52 men. The participants ranged in age from 21 to 72 ( $M = 43.80$ ,  $SD = 13.04$ ). Twenty-eight participants held a Private Pilot's License (PPL), with 55 holding an additional license (Commercial Pilot's License or Airline Transport License). Thirty-eight of the participants also held an instructor's license. Thirty-one of the participants (37.35%) either had been, or currently were, in the military.

The mean number of years of flying experience was 19.56 ( $SD = 11.98$ , range 1–46 years). The median number

of hours of flying time was 3,250 hr with a range from 70 to 22,198 hr.

Participants were primarily White (89.30%) with the remainder spread across African American, Hispanic, or other. Additionally, 71 (84.50%) were from the United States, with the rest from Europe. As a group, 74 participants held a college degree (associate's degree to graduate degree). Two just had a high school diploma, and an additional seven had a high school diploma plus some college.

## Instrumentation

For this study, two instruments were used. The first was the AGAQ, which was developed as an instrument to assess gender biases among pilots, specifically biases against female pilots (Vermeulen & Mitchell, 2007; Vermeulen, Wilson, & Mitchell, 2004). The instrument originally consisted of 72 items but was reduced to 43 items through confirmatory factor analysis on pilots in Australia and South Africa (Vermeulen & Mitchell, 2007). The AGAQ is composed of four factors as follows: flying proficiency, safety orientation, flight confidence, and erosion of flight standards. Cronbach alphas ranged from .81 to .92 (Vermeulen & Mitchell, 2007). Subsequent research has indicated that the AGAQ does not have any cultural bias that would limit its use with pilots from different cultures (Vermeulen, Schaap, Mitchell, & Kristovics, 2009).

The second instrument was the DASS-21 (Lovibond & Lovibond, 1995). The DASS-21 was derived from the DASS 42-item scale. The DASS 42-item scale purports to measure depression, anxiety, and stress. Aspects of depression assessed included lack of interest, anhedonia, inertia, hopelessness, self-deprecation, and loss of interest in life. The anxiety subscale taps into autonomic arousal, situational anxiety, and subjective perceptions of affect associated with anxiety. The stress subscale assesses chronic nonspecific stress or generalized stress – feelings of impatience, nervous arousal, irritability, and agitation. The DASS 42-item scale has shown appropriate discriminant and convergent validity with other scales, yielding a correlation of .81 between the DASS 42-item anxiety subscale and the Beck Anxiety Inventory, and .74 between the DASS 42-item depression subscale and the Beck Depression Inventory (Brown, Chorpita, Korotitsch, & Barlow, 1997; Lovibond & Lovibond, 1995), and appropriate convergence with the Hospital Anxiety and Depression Scale and the Personal Disturbance Scale (Henry & Crawford, 2005).

A 21-item research counterpart to the 42-item DASS was later developed (DASS-21) by Lovibond and Lovibond (1995). Comparison of the 42- and 21-item versions indicated the same factor structure and subscales, with commensurate discriminant and convergent validity (Anthony, Bieling, Cox, Enns, & Swinson, 1998; Clara, Cox, & Enns, 2001; Henry & Crawford, 2005). Additional research by Henry and Crawford (2005) suggested a negative affect dimension to both the depression and stress scale. The DASS-21 has shown consistent high levels of reliability

for the subscales (.82 to .93) and convergent validity across a number of studies with variations in participant ethnicity, clinical profile, and criterion measures (e.g., Akin & ?etin, 2007; Crawford & Henry, 2003; Gloster et al., 2008; Henry & Crawford, 2005). Additionally, the DASS-21 stress subscale has shown correlations from .65 to .76 with the widely used Perceived Stress Scale (Cohen, 1994) and correlations of .73 to .88 with the Children's Depression Inventory (Kovacs, 2011; Politano, 2014).

## Procedure

The study was reviewed and approved by the Institutional Review Board (IRB) at The Citadel, Charleston, South Carolina. Data were collected via SurveyMonkey. Participants were solicited by contacting pilot groups and through dissemination of the SurveyMonkey link to a list of known pilots who were asked to forward the survey link to other pilots. All responses were anonymous.

Additional information collected included extensive demographic data such as age, sex, education, ethnicity, hours of flying, type of aircraft, type of training, and general area of primary responsibility (i.e., military, commercial, etc.).

Data were analyzed using SPSS-17. Fluctuations in the degrees of freedom for various analyses reflect case drops due to missing information on one or more of the variables.

## Results

Comparisons were made by gender across variables using independent *t* tests to identify any significant differences. Effect size was computed using omega-squared tilde ( $\tilde{\omega}^2$ ) following Sheskin (2004) with ranges defined by Cohen (1988) as follows: less than or equal to .0588, small effect size; greater than .0588 but no more than .1379, medium effect size; and greater than .1379, large effect size.

There were no significant differences in age between men ( $M = 44.98$ ,  $SD = 10.74$ ) and women ( $M = 42.10$ ,  $SD = 16.46$ ),  $t(79) = 0.85$ ,  $p = .402$ ; years of flying experience (mean for men = 19.87,  $SD = 10.87$ , for women, 19.06,  $SD = 13.83$ ),  $t(81) = 0.28$ ,  $p = .784$ ; median hours of flying experience, Mann-Whitney  $U(83) = -0.005$ ,  $p = .996$ ; median hours of experience as an instructor, Mann-Whitney  $U(57) = -.077$ ,  $p = .939$ ; or highest flight certification, for men ( $M = 2.37$ ,  $SD = 0.64$ ) and women ( $M = 2.41$ ,  $SD = 0.73$ ),  $t(76) = -0.94$ ,  $p = .35$ .

On the DASS-21, there were no significant differences between men and women in their stress scores ( $M = 9.66$  and  $9.59$ ,  $SD = 2.35$  and  $2.13$ , respectively),  $t(61) = 0.68$ ,  $p = .497$ ; depression score ( $M = 7.88$  and  $7.63$ ,  $SD = 1.98$  and  $1.01$ , respectively),  $t(61) = 0.11$ ,  $p = .911$ ; or anxiety score ( $M = 7.68$  and  $7.71$ ,  $SD = 1.23$  and  $1.27$ , respectively),  $t(60) = -0.09$ ,  $p = .926$ .

On the AGAQ, there were significant differences between men and women across all four factors. On flying

**proficiency**, men rated themselves as more proficient than women ( $M = 62.03$ ,  $SD = 16.34$ ), while women significantly rated male flying proficiency considerably lower ( $M = 45.50$ ,  $SD = 12.67$ ),  $t(59) = 4.09$ ,  $p < .001$ ,  $\tilde{\omega}^2 = .21$ . On safety orientation, male pilots again rated themselves as safer than female pilots ( $M = 30.06$ ,  $SD = 3.41$ ), while female pilots rated male safety orientation significantly lower ( $M = 27.04$ ,  $SD = 3.55$ ),  $t(65) = 3.40$ ,  $p = .001$ ,  $\tilde{\omega}^2 = .14$ . On flight confidence, men rated themselves high ( $M = 17.36$ ,  $SD = 4.49$ ), while women rated men significantly lower on flight confidence ( $M = 14.95$ ,  $SD = 3.68$ ),  $t(66) = 2.35$ ,  $p = .022$ ,  $\tilde{\omega}^2 = .06$ . Men agreed among themselves that there was an erosion of flight standards specific to female pilots ( $M = 9.20$ ,  $SD = 2.83$ ), while women significantly disagreed with that perception ( $M = 5.48$ ,  $SD = 2.41$ ),  $t(59) = 5.38$ ,  $p < .001$ ,  $\tilde{\omega}^2 = .30$ .

AGAQ questions were regrouped into four categories: positive male attributes, positive female attributes, negative male attributes, and negative female attributes. A comparison of genders indicated that women did not perceive men as being as positive on positive male attributes as men did ( $M = 27.47$  and  $37.74$ ,  $SD = 8.36$  and  $10.41$ , respectively),  $t(62) = 3.94$ ,  $p < .001$ ,  $\tilde{\omega}^2 = .19$ , but did not significantly see men in a negative light ( $M = 11.62$  and  $10.97$ ,  $SD = 2.18$  and  $1.76$ , respectively),  $t(67) = -1.34$ ,  $p = .18$ ,  $\tilde{\omega}^2 = .34$ . Men, however, saw women as being low across positive female attributes ( $M = 27.00$ ,  $SD = 3.54$ ) and high on negative female attributes ( $M = 40.54$ ,  $SD = 11.51$ ) in comparison with female perceptions,  $t(63) = 2.42$ ,  $p = .016$ ,  $\tilde{\omega}^2 = .07$  and  $t(62) = 4.67$ ,  $p < .001$ ,  $\tilde{\omega}^2 = .24$ . In other words, women seemed to be saying that men are not as great as pilots as they think they are, but they are not bad, either. Men seemed to be saying that female pilots are not great as pilots, period, and they are just as bad as has always been perceived by male pilots.

Male pilots who consistently shared the flight deck with someone of the opposite gender were more equitable toward the other gender, as opposed to male pilots who rarely or never shared the flight deck with someone of the opposite gender. Specifically, male pilots who had shared flight decks rated women as significantly higher on flying proficiency,  $t(50) = 2.884$ ,  $p = .006$ ,  $\tilde{\omega}^2 = .13$ ; safety orientation,  $t(50) = 3.21$ ,  $p = .002$ ,  $\tilde{\omega}^2 = .16$ ; and having positive attributes,  $t(51) = 2.469$ ,  $p = .017$ ,  $\tilde{\omega}^2 = .09$ ; than did male pilots who had not shared the flight deck with a woman.

## Discussion

Despite research that suggests that female pilots are at greater risk for harassment, ostracism, negative perceptions, and sexism (Davey, 2004; Davey & Davidson, 2000; Mitchell et al., 2005), **the DASS-21 did not indicate any greater degrees of depression, stress, or anxiety in females pilots**, in what has been, and is still seen as, a male-

dominated profession. Indeed, this group of female pilots compared very favorably to male pilots across those factors that pilots use to judge the worth of another, such as flying experience, hours of flying, variety of flying opportunities, etc., thus suggesting that female pilots were no less prepared or well trained than male pilots. The perception, and in this data, the actuality of equal training and preparation by women seems to be a leveling factor that may ward off negative perceptions by women of women as pilots, thus negating female tendencies toward self-devaluation leading to depression, additional stress, or anxiety. Additionally, as suggested by Germain et al. (2012), male attitudes may have already taken their toll on female pilots, such that many women quit before finishing their training and those women still left are a harder lot less influenced by male attitudes.

Women also seem to be more accepting of the positive qualities of their male counterparts, perhaps suggesting that men are not as great as they think they are, but then, men are not bad pilots, either. Men, on the other hand, seem to hold to a more negative view of female pilots across the board, suggesting that men see female pilots as not being very good at flying a plane and, in fact, as being pretty bad at flying a plane. Thus, tolerances do not appear to be equal across the genders. There is then what appears to be sexism among male pilots based on AGAQ responses, but not a reciprocal sexism by female pilots. Additionally, female pilots in this study did not seem to have internalized the negative male image of female pilots, preferring to see themselves as equal, and indeed, even according more equality between the genders than that accorded by men.

Could the absence of greater stress, anxiety, and depression by female pilots, as well as the apparently greater degree of tolerance, in comparison with male pilots, be a function of female pilot personality characteristics? A study conducted by Novello and Youssef (1974) examined 87 female pilots using the Edwards Personality Preference Schedule. Results indicated that female pilot profiles more closely resembled the profile of men in general, and male pilots in particular. In other words, there was greater within-group variation than between-group variation (see also Musson, Sandal, & Helmreich, 2004). Whether or not these findings are still valid, given the comparatively large influx of women into the piloting profession since 1974, remains unclear (Baker et al., 2001). Apart from potential gender differences (or similarities), there is consistent evidence that pilots are generally less neurotic than the general population and higher on positive personality characteristics such as extroversion, interpersonal orientation, assertiveness, decision making, team cooperation, and emotional stability (Baker et al., 2001; Butcher, 1994; Butcher, 2002; Hörmann & Maschke, 1996; King, Retzlaff, Barto, Ree, & Teachout, 2012; Wakcher, Cross, & Blackman, 2003).

Within the sample were a small group of men who had flown with female pilots on the flight deck 25% of the time, and another group of men who had flown with female pilots on the flight deck 75% of the time. Familiarity seems to breed greater cross-gender respect, with those men who had shared the flight deck with women 75% of the time according women nearly equal status to men across all factors of the AGAQ. While the increases in scores by the

75% men over the 25% men were not significant, there was nevertheless a uniform pattern of higher ratings by men who frequently shared the flight deck with female pilots.

During the course of this research, the authors were privileged to observe e-mail traffic among some of the male pilots who had been asked to take the survey (no such e-mail traffic took place between female participants). While the e-mail traffic was obviously sent in jest between male colleagues, some of the comments vividly illustrated the underlying thoughts of some male pilots toward female pilots. As examples, the following were comments made by male participants: Comment 1: “Also, no female pilots were injured or harmed in any way, shape or form at my hands during my career (other than at their personal request)”; Comment 2: “I’m sure most of us would agree, female pilots would be better served sticking to acts of distaff [a woman’s domestic work] than aviating”; and the quite off-color Comment 3: “Beavers are for *after* flying...”. Such comments perhaps lend support to the conclusions drawn from these data that men are less accepting of women than women of men on the flight deck.

## Conclusions and Recommendations

Women operating in the male-dominated airline industry are an understudied group (Germain et al., 2012). Likewise, Germain et al. (2012) suggested that female pilots may be working in one of the most negative of all work environments.

This study was undertaken to examine gender-related perceptions of male and female pilots in the United States and Europe, and the extent to which such perceptions may cause workplace stress that may affect female pilots. The results of this study suggest that the element of sexism, with possible concomitant isolation and harassment of female pilots, is still present among male pilots in the United States and Europe; however, this sexism does not cause greater degrees of depression, stress, or anxiety in female pilots as compared with their male counterparts.

Germain et al. (2012) suggested that female pilots who have survived in this occupation must show greater than normal degrees of self-efficacy and self-confidence. This is an assumption that has intuitive merit. But at this point, this is only an assumption. Future research may want to expand on the current findings, as well as investigate personality characteristics of female pilots that may be different from *normal* and that allow these pilots to survive the still-hostile and sexist environment of the airline pilot industry.

Cockpit resource management (CRM) was introduced into commercial airline pilot training in the 1970s to reduce errors associated with human factors. CRM teaches pilots the principles of how to work together to maintain safe operation of an aircraft and, more importantly, how to work together to manage an aircraft emergency. To ensure the success of CRM, it is important that every member of the flight crew be accepting of each other (Vermeulen & Mitchell, 2007). Perceptions based on gender differences

can have a negative effect within a multicrew environment and therefore negatively affect flight safety (Vermeulen, 2009). Future CRM training should take into account the negative male attitudes toward female pilots, and when possible, flight simulation and testing should be conducted with multigender crews.

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